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10/507,054	06/13/2005	Theodor Doll	Mic.7745	8497
50811 7590 04/22/2009 O'Shea Getz P.C. 1500 MAIN ST. SUITE 912 SPRINGFIELD, MA 01115				
EXAMINER				
EOM, ROBERT J				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/507,054

Applicant(s)

DOLL ET AL.

Examiner

ROBERT EOM

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 14-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 14-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07/11/2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-8, 11, 12, and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardener et al. (USP 6,111,280), in view of Moos et al. USP (6,463,789 B2).

Regarding claims 1-3, Gardener et al. discloses an integrated gas sensor (Abstract), comprising a gas-sensitive semiconductor film (FIG. 1a, see: gas-sensitive layer 18; C3/L59-61) in contact with at least one contact electrode (FIG. 1a; see: metalisation layer 17; C3/L55-61), a field electrode being disposed under the gas sensitive semiconductor film (FIG. 1a, see: metalisation layer 9; C5/L22-30) and an insulator layer disposed in between the field electrode and the gas-sensitive semiconductor film (FIG. 1a, see: passivation layer 14; C3/L47-52). While Gardener et al. does not explicitly disclose the field electrode being disposed above and electrically in contact with a semiconductive substrate, Moos et al. teaches multiple equivalent embodiments of a gas sensor (**Fig. 5-8**) where the electrodes are either in contact with the substrate or an insulating layer, and under a functional layer or above a functional layer.

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one equivalent structural layout of a gas sensor for another in the gas sensor of Gardner et al., as taught by Moos et al. Mere substitution of an equivalent is not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See *In re Ruff* 118 USPQ 343 (CCPA 1958).

Additionally, while Gardener et al. does not explicitly disclose any specific thickness of the insulator layer, the change in the thickness of the insulator layer is not considered to confer patentability to the claims. As the electric field produced by the field electrode(s), and therefore the sensitivity controllability is a variable that can be modified, by adjusting said thickness of the insulator layer, with controllability increasing as the thickness is decreased, the precise thickness would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed thickness of the insulator layer cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the thickness of the insulator layer in the apparatus of Gardener et al. to obtain the desired sensitivity controllability (In re Boesch, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (In re Aller, 105 USPQ 223).

Regarding claim 4, modified Gardener et al. discloses all of the claim limitations as set forth above. Gardener et al. further discloses the field electrode comprises a plurality of microstructured field electrodes (FIG. 1a, see: metalisation layer 9; FIG. 3, see: the plurality of MOSFETs 22, 24)

Regarding claim 5, modified Gardener et al. discloses all of the claim limitations as set forth above. Additionally, while Gardener et al. does not explicitly disclose each one of the microstructured field electrodes as being individually drivable, the MOSFETs

of Gardener et al. are inherently individually driven since each MOSFET is designed with its individual source and drain terminal for control over its gate electrode.

Regarding claim 6, modified Gardener et al. discloses all of the claim limitations as set forth above. Gardener et al. further discloses at least one heater electrode, the heater electrode being integrated with the gas sensor (Abstract, see MOSFET heater 6).

Regarding claim 7, modified Gardener et al. discloses all of the claim limitations as set forth above. Gardener et al. further discloses driver electronics being integrated with the gas sensor (FIG. 3, see: Electronic IC area, C5/L14-21, see: CMOS SOI).

Regarding claim 8, modified Gardener et al. discloses all of the claim limitations as set forth above. Gardener et al. further discloses the driver electronics comprise a temperature control (C4/L22-29, see: CMOS integrated temperature sensor).

Regarding claim 11, modified Gardener et al. discloses all of the claim limitations as set forth above. Gardener et al. further discloses the gas-sensitive semiconductor film comprises SnO_2 (C3/L59-61, see: tin oxide).

Regarding claims 12, 14-16, Gardener et al. discloses a gas sensor (Abstract), comprising: a gas-sensitive semiconductor film (FIG. 1a, see: gas-sensitive layer 18; C3/L59-61); at least one contact electrode in electrical contact with the gas-sensitive film (FIG. 1a; see: metalisation layer 17; C3/L55-61); an insulator layer disposed next to the insulator layer (FIG. 1a, see: passivation layer 14; C3/L47-52); and at least one field electrode disposed next to the insulator layer (FIG. 1a, see: metalisation layer 9; C5/L22-30);

While Gardener et al. does not explicitly disclose any specific thickness of the insulator layer, the change in the thickness of the insulator layer is not considered to confer patentability to the claims. As the electric field produced by the field electrode(s), and therefore the sensitivity controllability is a variable that can be modified, by adjusting said thickness of the insulator layer, with controllability increasing as the thickness is decreased, the precise thickness would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed thickness of the insulator layer cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the thickness of the insulator layer in the apparatus of Gardener et al. to obtain the desired sensitivity controllability (In re Boesch, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (In re Aller, 105 USPQ 223).

Regarding claim 17, modified Gardener et al. discloses all of the claim limitations as set forth above. Gardener et al. further discloses the at least one field electrode comprises a plurality of field electrodes (FIG. 1a, see: metalisation layer 9; FIG. 3, see: the plurality of MOSFETs 22, 24).

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gardener et al. (USP 6,111,280), in view of Moos et al. (USP 6,463,789 B2), as applied to claim 1 above, in further view of Hijikihigawa et al. (USP 5,140,393).

Regarding claim 9, modified Gardener et al. discloses all of the claim limitations as set forth above.

Gardener et al. does not disclose the thickness of the gas-sensitive semiconductor film is at most approximately one-hundred times greater than a Debye length of the gas-sensitive film.

Hijikihigawa et al. discloses a semiconductor gas sensor device (C4/L45) which utilizes a sensitive tin oxide film (C4/L68-C5/L1) with the thickness of the tin oxide film (FIG. 1(a), see: distance d) is preferably as large as the Debye length (C4/L19-24).

Gardener et al. and Hijikihigawa et al. are combinable because they are concerned with semiconductor gas sensor devices.

It would have been obvious to one having ordinary skill in the art at the time of the invention to incorporate the, at most approximately one-hundred times greater than the Debye length of the gas-sensitive film, thickness of the gas-sensitive semiconductor film of Gardener et al., as taught by Hijikihigawa et al., to produce a gas sensor with an optimum value for the thickness of the gas sensitive layer with improved detection sensitivity (Hijikihigawa et al. C5/L25-29).

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gardener et al. (USP 6,111,280), in view of Moos et al. (USP 6,463,789 B2), as applied to claims 1 and 4 above, in further view of Haas et al. (USP 5,143,696).

Regarding claim 10, modified Gardener et al. discloses all of the claim limitations as set forth above.

Gardener et al. does not disclose the spacing between the plurality of the microstructured electrodes is on the order of a grain size of the gas-sensitive semiconductor film.

Haas et al. teaches a selective gas sensor (Abstract) with a sensitive zeolite crystal layer (FIG. 3, see: zeolite 1; C3/L23) with a crystal size between 0.1 and 80 micrometers (C3/L30, crystal size is synonymous with grain size in the art of semiconductors) with a plurality of microstructured field electrodes (FIG. 3, see: aluminum electrodes 12) with a width between 1 micrometer and 100 micrometers (FIG. 3, see: spacing between the aluminum electrodes is shown as equal to the width of the aluminum electrodes).

It would have been obvious to one having ordinary skill in the art at the time of the invention to make the spacing between the plurality of the microstructured electrodes on the order of a grain size of the gas-sensitive semiconductor film of Gardener et al., as taught by Haas et al., to increase the aspect ratio of the field electrodes to increase detection sensitivity (Haas et al. C4/L11-14).

Response to Arguments

7. Applicant's arguments with respect to claims 1-12 and 14-17 have been considered but are moot in view of the new ground(s) of rejection.

The applicant has amended language to the structural relationship between the field electrode and a semiconductive substrate (within the independent claims 1 and 12) for consideration upon merits for patentability.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **ROBERT EOM** whose telephone number is (571)270-7075. The examiner can normally be reached on **Mon.-Thur., 9:00am-5:00pm, EST**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/
Primary Examiner, Art Unit 1797

/R. E./
Examiner, Art Unit 1797